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MAY 9 1991

May 3, 1991

Mr. Fraser Lockhart
U. S Department of Energy
Rocky Flats Office
P O Box 928
Golden, Colorado 80402-0928

RE: REVIEW AND COMMENT: PHASE II RFI/RI WORKPLAN (BEDROCK): 903 PAD, MOUND, AND EAST TRENCHES (OU 2), DRAFT FINAL VERSION, JANUARY, 1991

Dear Mr Lockhart,

The Colorado Department of Health, Hazardous Materials and Waste Management Division (the Division) has reviewed the above referenced document prepared by DOE and it's prime operating contractor, EG&G The Division's comments are attached

There are some significant problems with this document that have been enumerated in the comments. It is our hope that dialogue between our staff members can rapidly resolve these deficiencies and tnat the final version of this document will be satisfactory to all parties

If you have any questions concerning these matters, please call Joe Schieffelin of my staff at 331-4421

Sincerely,

Gary W Baughman

Gary W Baughman
Unit Leader, Hazardous Waste Facilities
Hazardous Materials and Waste Management Division

cc Dan Miller, AGO
Martin Hestmark, EPA
Scott Grace, DOE
[redacted]
Brook Wilson, EG&G
Barbara Barry, RFPU

ADMIN RECORD

Colorado Department of Health

Review and Comment

Phase II RFI/RI Workplan (Bedrock), Draft Version, 1/91
903 Pad, Mound, and East Trenches (OU 2)

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General Comments:

1) The Draft Geologic Characterization Report (EG&G 1990a) and the Draft Task 3 Shallow High Resolution Seismic Reflection Profiling in the Medium Priority Sites (Operating Unit 2) at the Rocky Flats Plant (EG&G 1990b) are cited so many times within the text of this document that the Division may withhold approval of the final version of this RFI/RI until such time as we have reviewed the contents of these two documents. There are apparent problems with the conceptual depositional model for the Arapahoe formation presented in the text which the Division feels are probably traceable to the Draft Geologic Characterization Report. The sooner that this report is submitted to the regulatory agencies, the sooner resolutions to these problems can be worked out

2) If this plan, as presented, only includes the initial portions of what will comprise the final Phase II RFI/RI field implementation (as per the Executive Summary), a mechanism needs to be developed to inform the regulatory agencies of any changes or additions to the workplan The Division cannot approve half a plan We must know more about the scope and plan for the subsequent stages of this RFI/RI workplan before approval can be granted. The Division suggests that DOE include a decision tree that explains the various options available when certain conditions are encountered

3) The Division has determined that it is time to remedy a serious problem before the problem gets any worse or goes any farther The problem is sloppy preparation of maps and cross-sections The Division is surprised and dismayed by the lack of completeness and accuracy that some of the exhibits enclosed in this document display Elementary geologic techniques and protocols have not been employed, a fact pointed out in the following comments Furthermore, this is not the first time this has been pointed out to DOE. From this point on, contoured maps will not be accepted until each point used as a basis for the contours is represented by

the contoured data If maps are included without this data, the document will be rejected. This also includes cross-sections without directional labels, scales, and alpha-numeric labels. The mission of the regulatory agencies makes accepting inadequate maps and cross-sections impossible. Accepting incomplete exhibits encourages further sloppy work and may, ultimately, cause incorrect conclusions to be drawn.

Specific Comments:

Executive Summary Many times within this section, data that has not been validated is mentioned. Please add text explaining when this data will be validated and why it has not been validated yet

Executive Summary: In reference to the last paragraph on page ES-2, the Division is concerned about the priorities of the listed objectives for this RFI/RI. According to Part VI of Attachment 2 of the IAG, RFI/RI Workplans should "assure that each site identified in Table 1 is fully characterized and that a Baseline Risk Assessment is performed." From the text of this document, this relative priority appears to be reversed An accurate Baseline Risk Assessment depends on a complete characterization of the sites and any contamination found therein. Please revise the text to include this concept

Executive Summary: The very last paragraph of this section mentions that what follows, in the main body of the RFI/RI workplan, only represents an initial program which will be expanded throughout the course of the RFI/RI The Division believes that this approach is a good one and will allow DOE to take advantage of new discoveries and data and to capitalize on changing conditions However, it is unclear how much latitude DOE is building into this RFI/RI Please explain what percentage of the budget for this RFI is being used to complete the initial program, and what percentage will be available for subsequent investigations Also, please include an approximation of the impact that this extra budget would have in terms of number of additional wells, samples, cores, seismic, laboratory testing, etc. In addition, please explain how the additional program will be proposed to and approved by EPA and the State. As mentioned in the general comments, we cannot approve this plan until we understand all of it A decision tree would go a long way to explaining the "what-if's "

Section 1 0 Please revise the second paragraph to indicate that the IAG has now been signed

Figure 1-5: The stratigraphic column presented in this figure depicts bedrock sandstones 1 through 5 as being continuous The Division is under the impression that this is not the case In fact, based on the current understanding of these sands, they should be shown as discontinuous and lenticular Please revise

this figure

Section 1 3.2 3 "Arapahoe Formation": The Division is aware that a debate exists over where the Lower Arapahoe ends and the Upper Laramie begins. This section of the text implies that the debate is over. Please summarize the resolution of the debate in the text

The fourth sentence of the first paragraph needs some clarification. Please describe more fully how the "Geologic characterization of the Arapahoe Formation" was accomplished. Was the characterization of the Arapahoe based on literature, outcrop studies, core studies, seismic investigations, or a combination of all of these? Another term of unknown geologic origin is "stream channel-shaped structures." Please clarify the meaning of this term. We assume that the term refers to the opinion that the sands occurring beneath the plant seem to be paleo-channel filling sandstones.

Section 1.3 3 The first paragraph of this section makes reference to a 1973 Colorado Land Use Map Please use a more up-to-date source for your land use data RFP is increasingly surrounded by suburban areas. Many would not agree with your assertion that RFP is in a "rural area."

Section 1.4.2.4: Figure 1-6 is incorrectly referenced in this section. The correct reference should be Figure 1-7.

The text indicates that there are two locations for the Pallet Burn Site shown on Figure 1-6 (1-7). We were only able to locate one location for this SWMU on the map

Figure 1-9 This figure does a poor job of covering the area to be studied in this RFI/RI. Please re-plot this figure so that it covers a more appropriate area at a scale that allows the data presented to be deciphered.

Figure 2-2: If this figure represents the top-of-bedrock surface, why are contour 'highs' indicated beneath the perimeter road and the PSZ boundary as they cross the bottom of the South Walnut Creek drainage? This could be a coincidence, but we doubt it There is no data at these locations to indicate a bedrock high and regionally, the creek bottoms are bedrock lows

The contours around well 59-89BR also display some idiosyncrasies. The map currently indicates that well 59-89BR sits on a bedrock high that runs SSE. No other structure in this area displays this orientation. In fact, almost all structures have either an E-W or a NE-SW orientation in this area. Therefore, while the version presented is possible, perhaps a better interpretation would change the structural orientation in the vicinity of well 59-89BR to more closely match the surrounding trends

In addition, there is not a consistent contour interval between contour lines on this map In some places the interval is 10 feet, in others, it is 50 feet We are sure that this was done because of relative data density in different areas. However, when this is done, it should be noted on the map key and major contours (50 foot) should be highlighted with lines that are more bold. The reason this is important can be seen on the northeast corner of the map There is a data point in the bottom of creek that has a value of 5876' However, the 5890' contour ends prematurely and the next contour down is not labelled. If it is the 5850' contour, it is placed correctly. But, if it is the 5880' contour, then it is incorrect Right now, there is no way to tell if the map is correct. Again, this is elementary map construction and the Division expects these types of problems to go away

Section 2 1 1 2. Once again, the text implies that the Arapahoe/Laramie debate has been resolved Please summarize how a resolution was reached

The second paragraph of the text states definitively that the Arapahoe Formation was deposited by meandering streams and cites Weimer, 1973 as a source Please give the page number for this citation on meandering streams as the Division was unable to locate it within the article. In fact, on page 70 of the article, the last paragraph on the page indicates that the Arapahoe was deposited when stream gradients were much higher than during Laramie deposition. High gradients are not synonymous with meandering streams. On the following page (page 71) of the Weimer article, a more complete discussion of the delta plain environment is presented At no point are meandering streams mentioned

Furthermore, this section of the Weimer article discusses the wide occurrence of splay deposits, particularly splay sands, within the Laramie Formation. The text of the document also mentions these types of sands (as part of the Arapahoe). These splay and overbank sands do not fit into the category of 'channel sandstones' which the text stated was an all-inclusive category for sands beneath RFP (Section 1 3 2 3) Point bars do not fit this category either This contradiction in the geologic conceptual model needs resolution within the text

The descriptions of various sand body types presented in the remainder of the second paragraph of the text are fine, but they do not agree with the sand thickness isopachs on figures 2-3, 2-4, and 2-5 These figures imply major channel filling sands and do not account for point bars, splay deposits, or over-bank deposits Make the maps more definitive and include the subsidiary facies It is also important to emphasize that, as presented in the last sentence of this paragraph, channel **fill** deposits form in the manner indicated, but channel filling **sands** do not Meandering streams leave, within the rock record, extensive channel fill deposits and point bar deposits, but do not leave extensive channel

filling sands Again, this is not what the maps indicate. It is also difficult to include in a meandering stream environment and rock record the pervasive amounts of splay, overbank, and flood plain deposits present in the RFP bedrock. It is not difficult to place all these depositional facies in to a deltaic environment In fact, splay sands are, by definition, deltaic. The word "delta," however, is never used in the description of the bedrock geology within this document.

Throughout the remainder of this section, careful attention needs to be paid to the use of the terms "channel sand", "channel deposit", "channel fill," and "channel." These terms, and the misuse thereof, contribute to a poor understanding of the text. Perhaps using these terms in a more precise manner will force some re-thinking of the meandering stream concept and make the description of the stratigraphy more clear in the text.

Figure 2-3· Please place the sand thickness values that were used to construct this map next to the well and borehole locations This is not the first time that the Division has asked for this to be done and, unless map making for DOE changes, it will not be the last Putting datums next to the data point is a basic geologic map making technique that the State expects to see utilized in all Rocky Flats documents.

The importance of using this technique is illustrated by the fact that this map, on Figure 2-3, does not concur with the data presented in Table 2-1. Wells 24-87 and 57-89BR along with boreholes BH40-87 and BH41-87 are shown to be well within the sand body of sandstone #1 However, none of these wells or boreholes show that sand was penetrated in the equivalent stratigraphic position on Table 2-1 Assuming that Table 2-1 is correct (is it?), had these values been plotted on the map, the sand isopach would have been drawn differently

While we are on the subject of Figure 2-3, the Division feels obligated to comment further, even though this figure is not really a part of this document since Sand #1 is in the upper hydrologic unit Part of the sand body shown on the map is labeled "Ox Bow" and is implied to be filled with sand If this was a meandering stream environment, an ox bow, or abandoned channel cut-off, would not be filled with sand. Ox bows are the result of the active channel cutting across the neck of a meander in a rapid change of channel course Immediately after cut-off, this abandoned portion of the channel is empty of sediment (except, perhaps, a coarse channel lag) and is only filled with water The resulting ox bow lake is an extremely low energy environment that fills with mud, silt, and organic matter and very little sand

The sand body shown on Figure 2-3 implies a meandering stream depositional system. It also implies a 400' wide channel which is a very big river! If this was a meandering system, please explain

why the meanders are not filled with large point bar sands (i e , there should be a large point bar under the solar ponds and mound area, another under well 35-86, and another under ponds B-1 and B-2)

Figure 2-4· Please place datums next to the well locations used to construct this isopach.

Outlines for potential sand #2 subcrops are shown on the southern portions of this map. Please explain why these outcrops are not continuous across the contoured limits of sand #2. If the contours are correct, then there should be a continuous subcrop between the two "zero" contours where the bedrock surface intersects the sand.

Figure 2-5· Please place datums next to the well locations used to construct this isopach.

Why is the seismic anomaly shown on figures 2-4 and 2-5? Which sand actually showed the anomaly?

This map has the same subcrop problem commented on previously.

Figures 2-3, 2-4, and 2-5: The Division suggests that these exhibits be reconstructed into a "penetration" format. This would involve removing all well spots on a map that do not penetrate to the depth of the zone of interest This allows for a more precise presentation of the data and keeps the data from getting lost in a cloud of well-control that is irrelevant because it is not deep enough The Division also recommends that the cross-section and seismic line locations be removed from all of these isopach maps and placed, by themselves, on a separate map For further data presentation enhancement, we suggest that the sand bodies be shaded and that wells screened in the particular sand being mapped be high-lighted These data presentation methods will improve the communicability of the exhibits and more clearly show where additional data is needed

Figures 2-6, 2-7, and 2-8. While the Division recognizes the value of presenting cross-sections on a one-to-one scale, these figures, as presented, are almost worthless. Please re-draft these in a compressed horizontal scale so that they are easier to visualize and can be seen completely on one fold-out page

Standard presentation of cross-sections include both a vertical and horizontal scale, alpha-numeric label identification of the cross-section at the ends, and compass directions at the ends. For example, a hypothetical cross-section A-A' that runs north-south should have an "A" and the word "North" on one end, and an "A'" and the word "South" on the other end The Division is surprised and dismayed that these basic construction techniques need to be pointed out.

Figure 2-9 Figure 2-9 could be deleted from the text

Table 2-1· Not all of the wells and boreholes shown on this table could be located on the maps. In addition, not all the wells and boreholes shown on the maps could be located on the table. For example, wells 11-87, 11-87A, 13-87, and B315289 were on the maps but not on the table, and wells 59-86, 03-87, 05-87BR, 07-87BRA, and others were on the table, but could not be found on the map. Please remedy this situation.

Also, a separate column for well or borehole depth needs to be added In addition, stick diagrams of the gross lithologies presented at the same vertical scale as the cross-sections on Figures 2-6, 2-7, and 2-8 would be very helpful

Section 2 1 2.1: As this subject has been thoroughly discussed in the alluvial portion of the workplan, it is the Division's opinion that this section does not need to be included in the bedrock volume This would include Figures 2-10 and 2-11

Section 2.1.2.2· Please present, as a part of this section, any hypotheses that have been expounded as to why there is an apparent vertical gradient in the bedrock at RFP.

Section 2.2: There are some problems with Tables 2-2, 2-3, and 2-4. First, what is the difference between tables 2-2B and 2-2D? Also, what is the difference between tables 2-2B and 2-4B? In addition, contrary to the text on the previous page, weathered claystone data is presented on table 2-4. There are three pages to table 2-4, and an explanation of the differences between them is necessary

Tables 2-5A, 2-5B, and 2-5C Put in a set of maps showing the locations of each of these collection points

Figures 2-21, 2-22, and 2-23 Please put the datums next to the well locations on these maps

Section 2 3 2· Reference is made in the text to wells 774 and 2274 The Division was unable to locate these wells on any map Please include a map showing the location of these wells, particularly since they may be contaminant cross-flow locations

Table 3-1 The ARARs proposed in this table show a significant amount of inconsistency with previously submitted documents. This is true both for the specific ARAR values and for the chemical compounds for which ARARs have been proposed. The following paragraphs outline the inconsistencies by chemical compound group By way of general comment, it is the Division's opinion that the surface water standards promulgated by the Colorado Water Quality Control Commission are relevant and appropriate for this RFI/RI because any recovered contaminated water within this OU will

probably be released into the surface water environment after treatment Therefore, we have recommended that the ARARs be changed to reflect this

As additional general comment to the ARARs, we suggest the generation of a table in this RFI/RI similar to Table E-2 in the OU 2 Surface Water IM/IRA for South Walnut Creek This table included all the possible regulatory sources for ARARs and allowed a comparison of these levels for each chemical compound. A table like this would be very helpful in this document.

Organic Compounds: The following changes to the ARARs listed need to be made.

Compound	ARAR	Comment
Tetrachloroethylene	1.0U ug/l	WQCC surf wtr. std.
Chloroform	1 0U ug/l	WQCC surf wtr std.

The following organic compounds appear in either the OU 2 IM/IRA or the OU 2 Alluvial RFI/RI and need to be added to this workplan

Compound	ARAR	Comment
Vinyl Chloride	2 ug/l	WQCC surf. wtr. std.
1,1 Dichloroethane	5U ug/l	
1,1 Dichloroethene	7 ug/l	
1,2 Dichloroethene	5U ug/l	
1,1,2,2 Tetrachloroethane	1.0 ug/l	WQCC surf. wtr. std.
1,1,1 Trichloroethane		

In addition, the Division would like to know why an ARAR has been proposed for Carbon Disulfide

Metals The following changes to the ARARs listed need to be made

Compound	ARAR	Comment
Aluminum	0.15 mg/l	WQCC aqua. life std.
Beryllium	0 10 mg/l	WQCC agricult std
Copper	0 20 mg/l	WQCC agricult std.
Lead	±0.005 mg/l	WQCC aqua. life std (hardness dependent)
Magnesium	background	background TBC
Mercury	0 0002U mg/l	WQCC aqua life std
Molybdenum	0 1 mg/l	WQCC agricult std
Strontium	background	background TBC
Zinc	±0.025 mg/l	WQCC aqua life std. (hardness dependent)

The following metals appear in either the OU 2 IM/IRA or the OU 2 Alluvial RFI/RI and need to be added to this workplan

Compound	ARAR	Comment
Chromium III	0.01 mg/l	WQCC aqua. life std.
Chromium IV	0 01 mg/l	WQCC aqua. life std.

ARAR's· Metals (continued)

Compound	ARAR	Comment
Cobalt	0.05 mg/l	WQCC agricult std.
Vanadium	0.1 mg/l	WQCC agricult std.

Radionuclides: The following changes to the ARARs need to be made·

Compound	ARAR	Comment
Gross Alpha	7 pCi/l	The Woman Creek standard would apply unless it is known that treated water would only go to Walnut Creek, in which case 11 pCi/l would be the ARAR
Pu 239,240	0.05 pCi/l	WQCC surf. wtr. std.
H 3	500 pCi/l	WQCC surf. wtr std

Table 4-1 An additional bullet under the "Data Need" heading needs to be added to the second page of this table. It should read "Evaluate old boreholes and determine their role in possible cross-contamination." This is mentioned in the first bullet on the second page, but is important enough to be a separate item.

Section 5 6: It would be very helpful to add a matrix to this section that identifies all of the parameters needed to calculate the baseline risk assessment and which equations will be used, and shows how the data will be gathered that satisfies the requirements of these equations.

Section 5 6 1 2. Please explain the difference between the third and fourth bullets under the "exposure assessment process" section on page 5-6 Also, the sixth bullet should have the word "levels" replaced by the words "concentrations and intakes "

Table 8-1 The following comments to Table 8-1 should be considered while using Figure 8-1 This table represents the heart of this RFI/RI and the Division feels that it is a good plan However, we also feel it could be improved. We recognize that some of our suggested improvements will cost additional money We are not sure of the impact this will have on the overall budget for this RFI/RI, but are sure that feedback to these comments will make this clear.

First, as a general comment, the Division is concerned that, because the bedrock sands are not well understood and their subsurface locations might be hard to track down, as much data should be gathered at their **known** locations as is possible. For this reason, we have proposed drilling twins to wells and/or boreholes where the original hole drilled sand at a particular level, but is either plugged or screened in a different zone. These are locations where there is very low risk of sand

occurrence, and where the data could be very useful

Second, we have suggested a slight relocation of several of the well nests for the same reason presented above. If the Division felt that a particular well nest was located with an inordinate amount of dependence on the geological model, we have recommended moving the location to a point where the model plays a lesser role in predicting success for the objectives of that well nest. It is the opinion of the Division that over-dependence on **any** geologic model, regardless of its superiority, is unwise at this early point in the investigation.

Third, we suggest that all 20 of the initial boreholes be drilled to at least the stratigraphic level of sand #5. As many of these locations do not have data to this depth, the additional cost of the drilling is minimal compared to the stratigraphic control that will result

Cluster #1: It is stated that one of the purposes for this nest is to evaluate vertical gradients Please explain how this will happen if the nest will only include a screen in one sand (sand #2) Also, please explain what happens if no sand is found in the deeper stratigraphic levels at this location.

The Division recommends moving this location 150' to the south or southwest As it is presently located, this nest will miss the interpreted locations of all deeper sands. The closer to well B217589, which had sand #4, the better.

Cluster #2: The Division recommends moving this location 200' to the southeast We are concerned that the present location is too far from control in sands #3 and #4 to assure success An added advantage of the new location would be that it is between wells 18-87 and B217689, both of which are current sand #4 monitoring wells

We also recommend a twin to well 18-78 to be screened in sand #3

Cluster #7 The Division recommends moving this location 150' to the north-northeast At this new location, penetrating sand #4 would be more likely and the odds of picking up sand #3 would be improved

The Division also suggests drilling borehole B7 through the sand #5 stratigraphic level In addition, we recommend drilling two twins to well B217789 to be screened in sands #3 and #4.

Cluster #9 The Division recommends moving this location 175' to the southwest This would be closer to well 31-87 which is a sand #3 monitor and the new location would improve the chances of picking up sand #3. Also, this location is closer to the trenches and may help evaluate releases from them

The Division also suggests that borehole B9 be drilled through the stratigraphic level of sand #5

Cluster #12 The Division suggests drilling borehole B12 through the stratigraphic level of sand #5. Also, we feel that the location for Cluster 12 may penetrate sand #4 and, if it does, a well should be added to monitor this sand. In addition, we suggest drilling twins to wells 62-86 and 6-87A for the purpose of monitoring sand #4.

Cluster #13: The Division suggests drilling borehole B13 through the stratigraphic level of sand #5 We also suggest that W32 be removed from this plan until B13 proves the existence of a deeper sand. There is no evidence presented in this plan that sand #2 will be penetrated at this location

Cluster #14· The Division suggests drilling borehole B14 through the stratigraphic level of sand #5. We also suggest that a twin be drilled to well 14-87 to monitor sand #4 at that location

Cluster #18· The Division suggests drilling borehole B18 through the stratigraphic level of sand #5.

Cluster #19: The Division suggests adding a twin to well B217419 to monitor sand #4 at that location. In addition, we feel that there is a good chance of picking up sand #4 at the cluster 19 location and a monitor well for this sand may be necessary.

Cluster #20: The Division suggests adding a twin to well 16-87 to monitor sand #3. If borehole B20 penetrates sands #3 or #4, please plan on installing monitor wells at this location

Table 8-1 - General In addition to the 20 clusters proposed in this plan, the Division feels several more clusters should be added. Initially, these could be added as boreholes only, pending the encountered stratigraphy. If sands are penetrated, then follow-up stages of this RFI/RI could install monitoring wells screened in these sands. We suggest that all of these boreholes be drilled to at least the stratigraphic level of sand #5 The locations for the boreholes we would like added to the program are as follows

B21	250' south of well 28-87
B22	200' southeast of B218189
B23·	600' north-northeast of well 40-86
B24·	140' northwest of well 36-87

These locations are all downgradient from the east end of the east trenches and from the east spray fields, and are in areas potentially contaminated, but currently not in the plans to be characterized

In summary, we have suggested moving four of the 20 cluster locations, adding an additional four boreholes for stratigraphic testing, deepening six of the 20 planned boreholes, and drilling eight twins to existing wells Hopefully, these changes can be worked in to the plan without adversely affecting the budget for this project